EXPLANATION OF PLATES 80 AND 81.

Fig. 1. Transverse section, showing the rather faintly marked annual ring. × 40.
Fig. 2. Radial section, showing structure of a typical ray. × 200.
Fig. 3. Tangential section. × 200.
Fig. 4. Radial section, showing character of bordered pits and absence of Bars of SANIO. × 500.
Fig. 5. Radial section, showing trabeculae. × 200.
Fig. 6. Radial section, showing mucilage-filled tracheids. × 120.
Fig. 7. Transverse section, showing a broad band of traumatic tissue. × 40.
Fig. 8. Transverse section, showing three of the traumatic canals, enlarged. × 120.
Fig. 9. Radial section, showing mucilage-spaces. × 40.
Fig. 10. Radial section through the traumatic tissue showing the much thickened and pitted walls of the ray-cells in this region. × 200.
Fig. 11. Tangential section through the margin of the traumatic tissue, showing septate tracheids, tangential pits, and thick-walled ray-cells. Note the beautiful preservation of the bordered pit. × 500.
Fig. 12. Tangential section through the wide part of the traumatic band, showing the anastomosing mucilage-cavities crossed by the thick-walled rays. × 40.

AN ACCOUNT OF CERTAIN NOTEWORTHY FEATURES IN THE HABITAT OF RHODORA.

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FOR the enthusiastic collector, a large amount of interest always centers in *Rhodora*, not only because it is one of the most brilliant and fascinating of our early flowers, but also because it is commonly associated with bogs, of which it is generally held to be typical. For these reasons, any deviation from its recognized habit at once attracts attention and calls for some explanation. During the present spring large areas of this species have come under notice, and in some instances the size of the shrub and its particular habitat have presented such strong deviations from what one is accustomed to, as to suggest the importance of placing the principal facts on record.

At Shelburne, New Hampshire, in the valley of the Androscoggin,

there is a characteristic bog of somewhat more than an acre in extent, known as Wheeler's Bog. The central portion is at present occupied by a perfectly clear water field, while the margin, which is extending rapidly toward the centre, and occupies about two-thirds the entire area, affords an exceedingly fine example of the *Cassandra* stage in bog development. Here and there, however, small islands have gained a slight elevation above the *Cassandra* growth and exhibit the commencement of the next stage, that of broad-leaved trees, in which the common birch is represented. All about the margin of the bog, and extending into the interior of the *Cassandra* growth, there is an abundance of *Rhodora* which attains to a height considerably above 6 dms. Owing to the inaccessible character of the bog, it was not possible to take actual measurements, but there was a very strong impression that some of the bushes must be at least 9, and possibly 12 dm. in height. The particular point I wish to emphasize is the fact that this location affords a striking illustration of the typical habitat of *Rhodora,* which is described in the manuals as inhabiting "Cool bogs." [1]

A few days later, on the occasion of a visit to St. Andrews, New Brunswick, an opportunity was afforded for the examination of certain localities there. St. Andrews is somewhat farther north than Shelburne and is in close proximity to salt water, but judging by the character of vegetation, there is reason to believe that there can be no great climatic difference between the two places and for our present purposes, they may be regarded as essentially the same.

Geologically speaking, Shelburne is to be regarded as representing a much older geological formation than St. Andrews. The surface deposits consist of drift material derived in the main from Laurentian gneisses, intrusive granites and other rocks extending into the early Palaeozoic as far as the Cambrian. To this must also be added the material derived from erosion of innumerable trap dykes which intersect the older rocks everywhere.

At St. Andrews, on the contrary, the surface structure has been derived chiefly from red sandstone, usually regarded as Devonian, with which there has been mixed to some extent, the detritus of granite and trap dykes. How far this difference in the character of the soil may be a factor, it is at present impossible to say, as no observations in that direction have been made.

[1] The latest revision of Gray's Manual specifies "swamps and moist slopes."

Within the limits of the St. Andrews peninsula, *Rhodora* is abundant and widespread, occurring under somewhat widely different conditions of exposure and moisture; and as a detailed discussion of these features is desirable, it will be most profitable to deal with each locality studied. These are:—

1. Indian Point.
2. The eastern slope back of O'Neill's slaughter house.
3. The Protestant Cemetery.
4. The eastern slope near the Algonquin hotel pumping house.

The lower end of the St. Andrews peninsula is known as Indian Point, and for our present purpose, may be regarded as embracing all that portion which lies to the south of the Canadian Pacific Railway. This area lies at a low level and is only slightly undulating. The rather thin soil rests directly upon red sandstone, and it is so slightly above high water mark that the margin suffers marked erosion under the action of winter storms and tides, to such an extent that special means are required for the protection of the road skirting the beach.

The drainage is, on the whole, good. Within the timbered area there is practically no bog land. At one or two points near the margin of the woods, soft spots are to be observed, but these dry out in early summer. Elsewhere, the floor of the forest is the same as that generally characteristic of moist woodlands, i. e. it is covered with moss, *Cornus canadensis* and the herbage usually found in such situations. Numerous roads are cut through the wooded area, and these show the best of drainage.

The open areas are occupied chiefly by grasses and sedges, with scattering growths of *Spiraea latifolia* and *Kalmia angustifolia*. Apart from a small sink hole and a shallow bog of about one acre in extent, occupied entirely by *Typha latifolia*, there is nothing within the entire area of Indian Point, which falls under the designation of bog-land.

At least three fourths of the entire area at Indian Point is occupied by a dense growth of wood. This is composed, for the greater part, of black spruce and fir, and white cedar. With these there is mingled a large amount of the common alder. The trees within this area are all small, probably not exceeding 6–8 m., but the growth is so dense as to make it very difficult for one to penetrate to the interior. The floor is level, and wherever an opening admits sunlight, it is at once occupied by *Diervilla Lonicera*, *Cornus canadensis* and other plants common to open woodlands.

Rhodora does not penetrate to the interior of the wood, but is confined to the margin from which it has spread into the open areas. At one place, the shrub occurs where there is a slight bogginess in spring, though it does not attain its best development. At this time — the first of June — the locality is quite dry. Following the margin of the copse specimens occur more frequently toward the drier ground, and are constantly found in association with *Cornus canadensis*, *Diervilla*, ferns and mosses. On the south side where there is an extended open area toward the beach the shrub has passed much beyond the trees into the open and dry ground, where it appears to be extending.

In the open area just described, the shrubs are rarely over 30–40 cm. in height. On the western side of the woods, it is more commonly 6-9 dm. high. Here, however, several shrubs were found to have a height of 12 dm., while on the southern, western and northern sides, they were considerably taller. Careful measurements showed a number at least 1.5 m. high, while in one instance 1.6 m. was the result obtained. A noteworthy feature connected with these variations, was observed in the fact that the plants were always smallest in the open, while on the edge of the wood, where sheltered by the trees, they invariably attained their greatest height and stoutest stems.

The second locality studied, lies on the eastern slope of a rather high, gravelly ridge near its southern extremity, back of O'Neill's slaughter house and just above the Canadian Pacific tracks. The soil is perfectly well drained, and shows no indication of a swampy condition at any season of the year. The area was, until very recently, occupied by the common alder. *Rhodora* shows an abundant growth over a tract about two by eight rods in extent, but scattering specimens are found over three or four acres. None of the shrubs are over 6 dm. in height, and they therefore conform to the dimensions usually assigned to the species. No other Ericaceous plants occur in the immediate vicinity.

The Protestant Cemetery lies on the summit of a high, gravelly ridge opposite Minister's Island. On the top of this ridge, and within the limits of the Cemetery, there is a slight depression occupied by a shallow bog which becomes dry in summer, and, even on the first of June, shows very little moisture. This basin is about one acre in extent. Throughout its entire area, there is a good growth of *Iris versicolor*, and indifferent specimens of *Spiraea latifolia*. *Osmunda cinnamonea* and *Onoclea sensibilis* are abundant about the margin.

Rhodora is sparingly developed through the central area, but about the margin it becomes abundant and thence extends in scattering groups, into the adjacent drier areas of the summit. None of the specimens are large, with little or no variation in size, and it may be said that they conform very well to the general description of one metre or less. As one leaves the Cemetery and ascends the opposite slope on the summit of which the Algonquin hotel is situated, a noteworthy growth of the shrub is encountered at the position of the pumping station. The specimens spread over an area of one or more acres. The soil in this locality is a loose sand and gravel affording perfect drainage. The vegetation consists of poorly developed grasses, mixed with mosses and an abundant growth of the mountain cranberry (*Vaccinium Vitis-idaea*, var. *minus*). On the very summit of this ridge, on a dry gravelly bank close to the roadside, there were two very fine and vigorous clumps of *Rhodora* about 6 dm. in height.

Passing in review, the facts noted, it is to be observed that no locality has yet been found in the neighborhood of St. Andrews where *Rhodora* appears to assume the typical bog habit. The only apparent exception appears in the occurrence of a single specimen on the edge of a bog near Joe's Point, on the road to the Biological Station; and in another specimen near the Canadian Pacific Station, which also grows on the edge of a small bog. On the other hand, it is of interest to note that the most frequent occurrence is in well drained areas, and this fact is consistent with the occurrence of the plant on the high edges of gravel banks in deep railway cuttings, as was frequently noted on the line of the Maine Central before reaching Vanceboro, Maine.

The distribution of this species in the bog at Shelburne, as well as its frequent occurrence under typical bog conditions through northern Maine, is ample justification for the character usually assigned to it. But, that it is not necessarily a bog plant; that it commonly occurs in areas which are not at all swampy, and that its unusual height is best displayed under the protection of small trees, are facts of interest and importance which deserve further study. As, at this writing, the foliage is but feebly developed, it is impossible to determine how the external morphological features are correlated with the environment, but it may be possible to ascertain some facts bearing upon this question at a later date.

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